

Mathematics Draft Core Standards 2008-2009 Vermont Alternate Assessment

There are two prioritized Core Standards proposed for mathematics for the Vermont Alternate Assessment: Core Standard #1, Mathematics Content Knowledge, and Core Standard #2, Mathematical Problem Solving & Reasoning. Mathematics Content Knowledge is comprised of four subparts (A,B,C,D) that correspond with the mathematics strands assessed in the New England Common Assessment Program (NECAP) in grades 3-8, and 11. Alternate assessment portfolios are developed during grades 2 through 7 & 10 to match this instruction and assessment cycle. Each of the Content knowledge Core Standards identifies a number of *instructional focus* areas for educators to further prioritize the student learning objectives for the content area. The instructional focus areas are translated into *learning progressions* of successively more complex knowledge and skill targets across the three designated grade spans (Elementary 2-5; Middle 6-8; High 9-12) These are the math **Alternate Assessment Grade Cluster Expectations** from which educational teams must select specific learning targets for instruction and assessment.

Core Standard #2, Mathematical Problem Solving & Reasoning, corresponds to Vermont Standard 7.10. Skills and concepts for this Core Standard are not formally addressed discretely but are taught and assessed *within the context of the mathematics content*, just as science investigation is taught within the context of the domains of life, physical, and earth/space science.

Core Standards for Mathematics

1. Mathematics Content Knowledge

- A. Arithmetic, Number, & Operations Concepts
- B. Geometry & Measurement Concepts
- C. Functions & Algebra Concepts
- D. Data, Statistics, & Probability Concepts

2. Mathematical Problem Solving & Reasoning: Demonstrating an understanding of mathematical problem solving and communication through application of:

- A. [Mathematics skills/strategies](#)
- B. [Mathematical representations](#)
- C. [Reasoning](#)
- D. [Use of mathematical language](#)

While all four content strands are included in the core standard, the Mathematics Content Knowledge Standard represents reduced breadth and depth compared to the grade-level content GE assessed with NECAP. Mathematics content included for the alternate assessment has been prioritized to focus on concepts that reflect the essential core skills and ideas in mathematics and lend themselves to a variety of applications that can be expanded across grade levels.

The alternate assessment must address both of the Core Standards for mathematics:

#1 Mathematics Content Knowledge – Two (2) AA GCE from this Core Standard must be assessed in the portfolio. Each assessment year, there will be one *required* standard and one *optional* standard. The table on page 3 provides further guidance in making local decisions about which mathematics content strands to assess in a given year:

- The Arithmetic, Number & Operations strand is required at each grade 2-6.
- At grades 7 and 10, Data, Statistics, & Probability will be assessed, *perhaps* in conjunction with science.
- During the elementary cluster (grades 2-5) and middle school cluster (grades 6 & 7), all four (4) mathematics content strands will be assessed at least once.

#2 Mathematical Problem Solving & Reasoning - An *application* from this Core Standard must be *addressed* when assessing Core Standard #1, Mathematics Content Knowledge. **Blue text** used in the document shows many, but not all of the places that this integration might occur between math content knowledge and math problem solving and reasoning. For example, a student might be counting responses (Standard #1A Number & Operations) while collecting data to answer a question about favorite pets of classmates (Standard 1D Data, Statistics & Probability). A pictograph that shows the student's data will also address **mathematical representation** (Standard #2B, representation of math data).

Educators and IEP teams should consider the existing grade-level curriculum and the skills and knowledge of *each individual student* in order to determine which *aspects* of the Core Mathematics Standards to expand and how learning activities might integrate math content knowledge (Core Standard #1) with math problem solving and reasoning (Core Standard #2).

The NECAP support materials for mathematics instruction are a valuable resource to teachers that can be found at the following web links:

To find all NECAP mathematics support documents

http://education.vermont.gov/new/html/pgm_curriculum/mathematics/gle.html

Algebra grades K-8

http://www.necompact.org/ea/gle_support/Math/printables/functions.pdf

Geometry grades K-8

http://www.necompact.org/ea/gle_support/Math/printables/geometry.pdf

What the Grade-by-Grade Alternate Assessment Portfolio Plan <i>Could Look Like</i> for Mathematics for the 2008-2009 School Year					
Grade Levels	(#1) Mathematics Content Knowledge				(#2) Mathematical Problem Solving & Reasoning
	Arithmetic, Number, & Operations	Geometry & Measurement	Functions & Algebra	Data, Statistics, & Probability	Applying Math Skills & Using Representations, Reasoning, Language
Grade 2	Required	Suggested	Include for instruction	Include for instruction	<i>Integrated with a strand assessed</i>
Grade 3	Required	Suggested	Include for instruction	Include for instruction	<i>Integrated with a strand assessed</i>
Grade 4	Required	Include for instruction	Include for instruction	Suggested (corresponds with science*)	<i>Integrated with a strand assessed</i>
Grade 5	Required	Include for instruction	Suggested	Include for instruction	<i>Integrated with a strand assessed</i>
Grade 6	Required	Include for instruction	Suggested	Include for instruction	<i>Integrated with a strand assessed</i>
Grade 7	Include for instruction	Suggested	Include for instruction	Required (corresponds with science*)	<i>Integrated with a strand assessed</i>
Grade 8	Include for instruction	Include for instruction	Include for instruction	Include for instruction	Include for instruction
Grade 9	Include for instruction	Include for instruction	Include for instruction	Include for instruction	Include for instruction
Grade 10	Include for instruction	Include for instruction	Suggested	Required (corresponds with science*)	<i>Integrated with a strand assessed</i>
Grade 11	Include for instruction	Include for instruction	Include for instruction	Include for instruction	Include for instruction
Grade 12	Include for instruction	Include for instruction	Include for instruction	Include for instruction	Include for instruction

* Since data will be collected during science investigations, in most cases the mathematics data strand can be applied to science content.

AA Core Standards Mathematics Content Knowledge	VT GE	Instructional Focus	Elementary (2-5) AA Grade Cluster Expectation	Middle (6-8) AA Grade Cluster Expectation	High (9-12) AA Grade Cluster Expectation
<p>1A Arithmetic, Number, & Operations Concepts</p> <p><i>Essence:</i> Numbers and number concepts can be applied in real-world contexts to solve problems and communicate ideas.</p> <p>Mathematics has its own “language” of special words and symbols that can be used to communicate number concepts and number relationships.</p> <p><i>Some Essential Questions for Instruction:</i></p> <p>How can I use numbers and number words to describe compare, estimate, or solve problems?</p> <p>What’s a part? What’s a whole? How can I make equal parts when I have a set of things or an object to divide?</p> <p>How are adding and subtracting related?</p> <p>How is adding like multiplication?</p>	M1	Arithmetic, Number, & Operations	1e. Recognize numerals and <u>number words</u> (0-25, 0-50) [e.g., match a number to a number; identify a given number on a number line]	1m. Recognize numerals and <u>number words</u> (0-100)	1h. Recognize numerals and <u>number words</u> (0-1000)
	M2	Count, group, order, and manipulate whole numbers, fractions, decimals, and percents	2e. Count up to 20 concrete objects using 1:1 correspondence	2m. Count up to <u>50</u> concrete objects using 1:1 correspondence	
	M3		3e. Create and compare sets of concrete objects <u>using appropriate language</u> (zero, none, more, less, same, equal)	3m. Create, compare, and <u>estimate quantities</u> (e.g., sets of objects, groups of people, materials needed for a project) <u>using appropriate language</u> (zero, none, more, less, same, equal, <u>enough</u>)	3h. Create, compare, and estimate quantities <u>across subject areas</u> (e.g., money earned, books by one author, planets with moons, stars in the sky) <u>using appropriate language</u> (zero, none, more than, less than, same, equal, enough)
	M4	Represent quantities using concrete, pictorial, and symbolic representations			
	M5		4e. Identify coins as money <u>and by name</u> (penny, nickel, dime, quarter) [e.g., Show me a penny, a nickel]	5m. Recognize, identify <u>and order the values of a penny, nickel, dime, quarter, dollar, using appropriate language</u> (more than, less than)	
	M6	Use the “language” and symbols of numbers, number concepts, and number relationships (e.g., more/less, greater than/less than, same/equal, none/zero, first/second/next/last, positive/negative)	5e. Recognize or identify the value of penny, nickel, dime, quarter	6m. Recognize or identify the value of a set of up to <u>10 coins</u> ; <u>recognize and use decimal representations for money values</u> [e.g., \$.10, \$.25]	
	M7	Represent mathematical relationships with objects, pictures, words, and symbols	6e. Recognize or identify the value of a set of up to 5 coins by joining sets/using addition [e.g., 4 pennies is 4 cents plus 1 nickel is 5 cents more = 9 cents]		
	M8	Understand the concept of place value	7m. <u>Solve</u> simple addition and subtraction money <u>problems</u> using coins and values up to \$1	7m. <u>Solve</u> addition and subtraction money <u>problems</u> using coins and values <u>up to \$10</u>	7h. <u>Solve</u> addition, subtraction, <u>multiplication, and division problems with money</u> [e.g., using coins and
		Understand the concepts of whole, part, and equal parts			
		Solve problems using money, fractions, and decimals.			

<p>How is subtraction like division?</p> <p>How are multiplication and division related?</p> <p>What is place value and how can we use it to understand, compare, and order numbers?</p>			<p>9e. Distinguish between whole and parts of objects, shapes, or sets of objects [e.g., is this a whole pizza, what does a part look like; can you make 2 parts from the whole]</p> <p>10e. Use fractions to identify or describe parts of the whole or equal shares of the whole (half, third, fourth) [e.g., divide geometric shapes into 2, 3, and 4 equal parts; Match the unit fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ with objects, pictures, words, sets]</p> <p>11e. Use area, set, or linear (number line) models to identify, order, or compare whole numbers, fractions (half, thirds, fourths, and mixed numbers <u>using appropriate language (more than, less than, same, equal)</u>[e.g., show 5 equal parts of the whole set]</p> <p>12e. Recognize the symbols +, -, and = ; explain the meaning/use of the symbols + (joining sets), - (separating sets), and = (same amount)</p>	<p>8m. <u>Locate and compare rational numbers (positive and negative integers) using a model (number line, thermometer, etc.) [e.g., is this number greater than or less than zero; is this a higher/lower temperature; where would you place “-2”]</u></p> <p>9m. Distinguish between whole and parts <u>using decimals to identify or describe parts of the whole</u> [e.g., color grid or cover tiles to show .1, .2, .5, etc.]</p> <p>10m. Use fractions to identify or describe parts of the whole or equal shares of the whole (half, third, fourth, <u>fifth, sixth, eighth</u>) [e.g., divide geometric shapes into <u>2-8</u> equal parts; Match the unit fractions with objects, pictures, sets]</p> <p>11m. Use area, set, <u>and</u> linear (number line) models to identify, order, or compare whole numbers, fractions, and mixed numbers <u>using appropriate language (more than, less than, same, equal)</u> [e.g., place $\frac{1}{2}$, 1 and $1\frac{1}{2}$ on a number line and describe which is the largest number]</p> <p>12m. Recognize the symbols +, -, X, \div, and =; explain the meaning/use of the symbols + and X (joining sets) and - and \div (separating sets)</p>	<p>bills; using symbolic representations]</p> <p>8h. Locate, <u>order</u>, and compare numbers (fractions, decimals, whole numbers, positive and negative integers) using a model (number line, thermometer, etc.) or manipulatives</p> <p>9h. Use fractions, decimals, <u>and percents</u> to identify, describe, <u>or compare</u> parts of the whole <u>using appropriate language (more than, less than, same, equal)</u></p> <p>10h. <u>Solve problems with addition and subtraction of fractions with common denominators</u> (halves, thirds, fourths, fifths, sixths, eighths)</p> <p>11h. <u>Represent equivalent amounts in multiple ways using fractions, decimals, and percents</u> [e.g., <u>match a picture where the object has been cut in half to the symbol for $\frac{1}{2}$, or 0.5, or 50%; match \$.50 = 50¢</u>]</p>
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		<p>13e. Recognize the symbol \times for multiplication; explain the meaning/use of the symbol \times (joining sets)</p> <p>14e. Apply understanding of <u>mathematical symbols</u> to compute basic addition and subtraction facts using manipulatives or calculator</p> <p>15e. Apply understanding of <u>mathematical symbols</u> to compute basic multiplication facts using manipulatives or calculator</p> <p>17e. Represent 2-digit whole numbers in tens and ones using base ten models, coins, or manipulatives [e.g., 54 cents = 5 dimes (tens) + 4 pennies (ones)]</p> <p>18e. Identify the place value in 2-digit whole numbers; Order 2-digit numbers using place value [e.g., which is larger 24 or 42]</p> <p>19e. Compose and decompose 2-digit whole numbers [e.g., 54 has of 5 tens and 4 ones; $50 + 4$]</p>	<p>14m. Apply understanding of <u>mathematical symbols</u> to compute basic multiplication, <u>and division</u> facts using manipulatives or calculator</p> <p>16m. Create sets using objects to <u>showing factors and multiples of given numbers</u></p> <p>17m. Represent 2-digit, <u>3-digit, and 4-digit</u> whole numbers using models or manipulatives [e.g., 54 cents = 5 dimes (tens) + 4 pennies (ones)]</p> <p>18m. Identify the place value in 2-digit <u>3-digit, and 4-digit</u> whole numbers; <u>Order 3-digit number using place value</u> [e.g., which is larger 240 or 402]</p> <p>19m. Compose and decompose 2-, <u>3-, & 4-digit</u> whole numbers</p>	<p>14h. Apply understanding of <u>mathematical symbols</u> to <u>compute basic percent or proportion problems</u> using a calculator [e.g., what would a tip be if 10%, 20%]</p> <p>16h. Create sets, models, <u>or representations</u> (drawing, chart, table, factor tree) showing factors and multiples of given numbers</p> <p>18h. Identify the place value in whole numbers <u>and decimal numbers to the tenth and hundredth places</u>; <u>Order whole and decimal number using place value</u> [e.g., which is larger .2 or .02]</p>
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AA Core Standards Mathematics	VT GE	Instructional Focus	Elementary (2-5) AA Grade Cluster Expectation	Middle (6-8) AA Grade Cluster Expectation	High (9-12) AA Grade Cluster Expectation
1B Geometry & Measurement Concepts <i>Essence:</i> Measurement and geometry concepts are used in the arts (dance, music, visual arts), science investigations, and in the design and building of structures of all kinds. The “language” and symbols of measurement and geometry are used to communicate relationships about every day objects and materials. <i>Some Essential Questions for Instruction:</i> How can use the physical characteristics of objects and materials to describe and compare them? Where can we find geometric shapes and figures around us? What tools and units of measure do we have to measure and describe very large and very small things?	M9	Geometry & Measurement	1e. Sort and re-sort objects or figures by one physical attribute (e.g., color, shape, size, number, object)	1m. Sort and re-sort 2-D <u>and 3-D items</u> by physical attributes	1h. Use physical attributes to <u>identify relationships between 2-D and 3-D figures</u> [e.g., find the circles on a cone and cylinder]
	M10	Recognize, identify, describe, reproduce/draw, and compare geometric figures			
	M11				
	M12	Identify shared attributes of geometric figures and uses as a basis for sorting	2e. Recognize or identify basic 2-D geometric shapes by name: circle, square, triangle, pentagon, hexagon, octagon	2m. <u>Recognize or identify 3-D figures by name</u> (cone, sphere, cylinder, cube, pyramid, rectangular & triangular prism); <u>locate/match common objects to 3-D geometric figures</u> [e.g., baseball = sphere]	2h. Recognize or identify 3-D figures by name (cone, sphere, cylinder, cube, pyramid, rectangular & triangular prism); <u>locate/match common objects in the environment to 2-D and 3-D geometric figures</u>
	M13				
	M14	Uses the “language” of comparison (more/less, larger/smaller, shorter/longer, congruent, similar) to describe and compare geometric figures	3e. Recognize , identify or describe attributes (sides, corners, shape) of 2-D geometric figures (circle, square, triangle, rectangle, pentagon, hexagon, octagon)		
	M15				
	M16	Use proportional relationships to solve problems with map or grid interpretation			
	M17				
	M18	Represent real situations and mathematical relationships graphically and symbolically Identify and use standard measurement tools (clock, timer, calendar, scale, ruler, meter stick, cup, beaker, thermometer, temperature probe,) Use and apply equivalents of measurement in the same system Estimate, describe, and	4e. Manipulate figures (rotation, reflection, translation) to determine whether geometric figures are congruent (same size and shape) 5e. Compose and decompose 2-D figures to show part-whole relationships [e.g., 4 triangles can make a rectangle; use 2 half circles to make a circle] 6e. Apply a strategy to find the perimeter of various	4m. Manipulate figures (rotation, reflection, translation) to determine whether geometric figures are congruent (same size and same angles/shape) <u>or similar (same angles/shape but different size)</u> 6m. Apply a strategy to find the perimeter and area of	6h. Solve problems to find the perimeter and area of real-

<p>How do geometry and measurement help us when we want to paint a picture, make a design, or build something?</p>		<p>compare objects based on measurement</p>	<p>polygons [e.g., measuring each side and adding, adding given measurements, using tiles to “measure” total of all sides]</p> <p>7e. Follow given direction(s) involving a combination of positional concepts; <u>choose /use appropriate vocabulary to describe relative positions of objects (e.g., over/under, next to, left/right, up/down)</u></p> <p>10e. Estimate and measure capacity, length, height, weight, and temperature to nearest full unit (inch, foot, centimeter, meter, ounce, pound, cup, quart, minute, hour, degrees) [e.g., is this closer to one foot or 2 feet long]; compare common objects after measuring <u>using appropriate units and dimensions</u> [e.g., today’s <i>temperature is 5 degrees colder than yesterday’s temperature</i>]</p> <p>11e. Tell time on a clock to the nearest hour and half hour (analog or digital); <u>apply concepts of time to</u></p>	<p>various geometric figures [e.g., circles and polygons]</p> <p>7m. <u>Locate, describe, or compare relative positions of objects or places on a simple map or grid</u>; <u>choose /use appropriate vocabulary to describe relative positions (e.g., over/under, next to, left/right, up/down)</u></p> <p>9m. <u>Construct models of solid figures [e.g., cube = 6 squares; cylinder = 2 circles + rectangle; pyramid = square + 4 triangles]</u></p> <p>10m. Estimate and measure capacity, length, height, <u>width, time</u>, weight, and temperature to nearest full unit (inch, foot, centimeter, meter, ounce, pound, cup, <u>gram, kilogram</u>, quart, <u>seconds</u>, minute, hour, degrees); compare common objects after measuring <u>using appropriate units and dimensions</u> [e.g., <i>this is 2 feet in length and that’s longer than...</i>]</p> <p>11m. Tell time on a clock to the nearest hour, half hour, and <u>quarter hour</u> (analog and digital); <u>apply concepts of</u></p>	<p><u>world spaces</u></p> <p>7h. Locate, describe, or compare relative positions of points on a map or grid; <u>choose /use appropriate vocabulary to describe relative positions (e.g., over/under, next to, left/right, up/down)</u></p> <p>8h. <u>Use the scale (e.g., on a map, atlas, globe, grid) to compare or describe relative distances</u></p> <p>9h. Construct models of solid figures [e.g., cube = 6 squares; cylinder = 2 circles + rectangle; pyramid = square + 4 triangles]</p> <p>10h. Estimate and measure capacity/<u>volume</u>, length, height, width, time, weight, and temperature to nearest full unit using appropriate tools compare common objects after measuring <u>using appropriate units and dimensions</u> [e.g., <i>this is 2 feet longer than...</i>]</p> <p>11h. Tell time on a clock to the <u>nearest 5 minutes</u> (analog and digital); <u>solve simple problems</u> using elapsed time</p>
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			creating and following schedules or calendars	<p><u>time to estimate elapsed time to the nearest hour and half hour</u></p> <p>12m. <u>Match a variety of measurement units with their uses [e.g., length can be measured in inches/ feet and centimeters/meters; weight can be measured in ounces and pounds or grams/kilograms; time can be measured in minutes, hours, days, years]</u></p> <p>13m. <u>Use multiple strategies (X, ÷, graphic display) and the given conversion factor (e.g., 12 inches = 1 foot; 7 days= 1 week) to convert one unit of measurement to another unit in the same system [e.g., a pictograph shows that there are 6 feet in 2 yards; student multiplies 3 x 2 = 6, given conversion factor to show that 6 feet = 2 yards]</u></p>	<p>12h. Match a variety of measurement units with their uses [e.g., length can be measured in inches and feet; weight can be measured in ounces and pounds; time can be measured in minutes, hours, days, years]</p> <p>13h. <u>Use multiple strategies (X, ÷, graphic display) and the given conversion factor (e.g., 12 inches = 1 foot; 7 days= 1 week) to convert one unit of measurement to another unit in the same system [e.g., a pictograph shows that there are 6 feet in 2 yards; student multiplies 3 x 2 = 6, given conversion factor to show that 6 feet = 2 yards]</u></p>
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AA Core Standards Mathematics	VT GE	Instructional Focus	Elementary (2-5) AA Grade Cluster Expectation	Middle (6-8) AA Grade Cluster Expectation	High (9-12) AA Grade Cluster Expectation
<p>1C Functions & Algebra Concepts</p> <p><i>Essence:</i> Algebra concepts can be used to solve everyday problems and during investigations.</p> <p>Algebra has many symbols that communicate unknown and known quantities during problem solving.</p> <p><i>Some Essential Questions for Instruction:</i> What's a pattern and where can we find them in nature (plants, animals, earth materials) and in human-made things (dance, music, sounds, clothing) ?</p> <p>How can we use a "rule" to describe or extend a pattern? How are different kinds of counting really different patterns with numbers?</p> <p>How can we use symbols and number to figure out unknown quantities?</p>	<p>M19</p> <p>M20</p> <p>M21</p> <p>M22</p>	<p>Functions & Algebra</p> <p>Identify, reproduce, create, describe, and extend patterns (in the environment, visual, auditory, kinesthetic, rhythmic, numeric)</p> <p>Count in patterns (e.g., skip counting)</p> <p>Group sets of objects to show equal groupings (2s, 3s, 4s, 5s, etc.)</p> <p>Use concrete and symbolic representations for unknown quantities</p> <p>Determines values of variables in simple equations</p> <p>Evaluate number sentences by replacing variables with given values</p> <p>Use and apply equivalents of measurement</p> <p>Use proportional relationships to solve problems</p> <p>Represent real situations and mathematical relationships graphically and symbolically</p>	<p>1e. Recognize simple visual, rhythmic, auditory, or kinesthetic repeating patterns (ABAB) [e.g., what comes next]</p> <p>2e. Reproduce, extend, or create a repeating pattern [e.g., visual: red tile, green tile; Numeric: 1,2,1,2; auditory: clap, tap)</p> <p>3e. Recognize simple growing patterns (ABBCCC)</p> <p>4e. Reproduce, extend, or create a growing pattern; describe the pattern [e.g., add 1]</p> <p>5e. Use a rule to reproduce and extend a repeated and a growing pattern</p> <p>6e. Skip count to show numeric patterns (count by 2s to 20; count by 5s to fifty); Group objects by 2s, 5s, 10s, etc.</p> <p>7e. Describe a pattern in a series of numbers (e.g., 1,2,3,...; 2,4,6,...; 1,2,1,2,1,...)</p> <p>8e. Manipulate pictures or</p>	<p>1m. Recognize simple repeating patterns, including numeric patterns (ABAB; 3,5,3,5,) [e.g., what are the next 3 elements]</p> <p>2m. Reproduce, extend, or create a repeating pattern, including numeric patterns</p> <p>3m. Recognize or describe simple growing numeric patterns (2,4,6;; 10, 20, 30)</p> <p>4m. Reproduce, extend, or create a growing numeric pattern; describe the pattern [e.g., add 3]</p> <p>5m. Recognize or determine a rule for a numeric pattern [e.g., add 2]</p> <p>7m. Analyze a pattern to determine what is missing [e.g., 2, 3, 4, __, 6; input-output table with 5, 10, __, 20]</p> <p>8m. Manipulate quantities to</p>	<p>2h. Reproduce, extend, and create a repeating numeric pattern</p> <p>3m. Recognize or describe linear (growing) patterns when presented graphically [e.g., line graph with steep line is growing faster than line with less slope; both are growing, but one is growing faster]</p> <p>4h. Reproduce, extend, and create a growing numeric pattern; describe the pattern [e.g., add 3]</p> <p>5h. Recognize and determine a rule for a numeric pattern [e.g., subtract 3; double the number]</p> <p>7h. Analyze a pattern to determine what is missing [e.g., 2, 3, 4, __, 6; complete an input-output table and graph the results]</p> <p>8h. Manipulate quantities to</p>

			<p>objects to create sets and determine missing objects/unknown quantities</p> <p>9e. Construct and solve open sentences that have variables, with one operation - addition or subtraction [e.g., $? 7 = 10$; $? 7 = 10$]</p>	<p>create number sentences [e.g., $? 7 = 10$] and determine missing/unknown quantities</p> <p>9m. Construct and solve open sentences that have variables, using all four operations [e.g., $? 4 = 20$]</p> <p>10m. <u>Evaluate expressions when values are given</u> [e.g., what is $? 7$ when $? 2$, when $? 4$, etc.]</p>	<p>create algebraic expressions, using letters to represent unknown quantities [e.g., If $A \times 4 = 20$, then $A = 5$] and determine missing/unknown quantities</p> <p>9h. Construct and solve open sentences that have variables, using all four operations [e.g., $? 4 = 20$]</p> <p>10h. Evaluate expressions when values are given for X [e.g., what is $X + 7$ when $X = 2$, when $X = 4$, etc.]</p>
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AA Core Standards Mathematics	VT GE	Instructional Focus	Elementary (2-5) AA Grade Cluster Expectation	Middle (6-8) AA Grade Cluster Expectation	High (9-12) AA Grade Cluster Expectation
1D Data, Statistics, & Probability Concepts <i>Essence:</i> The skills of predicting, observing, measuring, recording, organizing, and summarizing data can be used to answer questions. Data can be organized in many ways to communicate mathematical information visually. <i>Some Essential Questions for Instruction:</i> What is data? What tools do we have for recording and organizing data? How do we use evidence to supports our conclusions? What is “probability” and makes a game fair or not fair?	M23	Data, Statistics, & Probability	1e. Recognize, identify or formulate a plausible question for collecting data [e.g., how many pets does each person have; which flavor is the favorite]	1m. Choose or formulate a question [e.g., how hot will it get each day this week] <u>and record data to answer the question</u>	1h. Choose or formulate a question [e.g., do ants prefer bread or sugar] and record data to answer the question
	M24	Represent data in different formats			
	M25	Interpret and draw conclusions using data	2e. Record, and organize data to communicate information (pictograph, bar graph, tally chart, line plot, tree diagram, table, labeled drawing/diagram)	2m. Record, and organize data to communicate information (pictograph, bar graph, tally chart, line plot, tree diagram, table, labeled drawing/diagram, circle graph , frequency chart , Venn diagram , histogram)	2h. Record, and organize data to communicate information (pictograph, bar graph, tally chart, line plot, tree diagram, table, labeled drawing/diagram, circle graph, frequency chart, Venn diagram, histogram)
	M26				
	M27	Classify events as likely or unlikely to happen			
	M28	Understand cause/effect			
	M29	Answers questions about things observed, manipulated, or predicted	3e. Use a data display (pictograph, bar graph, tally chart, line plot, tree diagram, table, labeled drawing/diagram) to retrieve information to answer a question [e.g., the temperature on Tuesday was 50 degrees]	3m. Use a data display (pictograph, bar graph, tally chart, line plot, tree diagram, table, labeled drawing/ diagram, circle graph , frequency chart , Venn diagram , histogram) to retrieve information to answer a question	3h. Use a data display (pictograph, bar graph, tally chart, line plot, tree diagram, table, labeled drawing/ diagram, circle graph , frequency chart , Venn diagram , histogram) to retrieve information to make and justify a conclusion (states/ recognizes appropriate/accurate pattern, trend, results) [e.g., states conclusion “ants prefer sugar “ using data to support the conclusion “all 10 ants stayed near the sugar for 30 minutes”]
		Formulate questions for data collection about things observed or manipulated when cued or on own			
			4e. Use a data display to analyze data and describe results using appropriate language (zero, none, never, more, less, same, equal)	4e. Use a data display to analyze data (states pattern, trend, results) and describe results using appropriate language (zero, none, more, less, same, equal)	
			5e. Given a probability event (such as flipping a coin to get heads or tails, or 3 colors of marbles in a bag), use reasoning	5m. Given a probability event (such as flipping a coin to get heads or tails, using a spinner with 5 color wedges, rolling a	5h. Given a probability event (such as using a spinner, rolling a die), use reasoning to predict or explain whether an event is

			<p>to predict or explain whether an event is likely, unlikely, or impossible [e.g., could I pull a red sock out of this bag? A blue sock? Will it always be heads when I flip a coin]</p> <p>6e. Uses counting strategies to solve problems involving determining possibilities [e.g., how many ways can you make 10 cents using these coins]</p>	<p>die), use reasoning to predict or explain whether an event is equally likely, more likely, less likely, certain, or impossible</p> <p>6m. Uses counting strategies to solve problems involving combinations or simple permutations [e.g., how many ways can you get from A to B using this grid or map; how many different sandwiches could you make with these 3 fillings]</p>	<p>equally likely, more likely, less likely, certain, or impossible, expressing the result as a proportion of part to whole [e.g., it is likely to happen 1 out of 4 times]</p> <p>6h. Uses counting strategies to solve problems involving combinations or simple permutations [e.g., how many ways can you get from A to B using this grid or map; how many different outfits could you wear with these pants and shirts]</p>
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AA Core Standards Mathematics Problem Solving & Reasoning	VT GE	Instructional Focus	Elementary (2-5) AA Grade Cluster Expectation	Middle (6-8) AA Grade Cluster Expectation	High (9-12) AA Grade Cluster Expectation
2 Mathematical Problem Solving & Reasoning <i>Essence:</i> Problem solving in mathematics involves using the skills and strategies you've learned with different ways of thinking about the problem. Solutions to mathematics problems are communicated by explaining what you did using mathematical language, symbols, and visual representations.	M30	Problem Solving & Reasoning Works with others to generate approaches and solutions to solving problems Uses a variety of mathematical representations to communicate solutions or results Makes connections using observations of self and others Organizes information/data for intended meaning Communicates about reasoning used, observations, and ideas Shares ideas using a variety of forms (e.g., speaking, writing, drawing, pictures in a sequence)	1e. Applies mathematics skills (adding, subtracting, or multiplying) and strategies (using manipulatives, calculator, drawing, etc.) to solve a variety of problems 2e. Communicates mathematical ideas, relationships, and solutions using a variety of grade-appropriate mathematical representations 3e. Demonstrates use of mathematics reasoning through actions, words/explanation, making connections, or extending ideas 4e. Uses mathematical language appropriate to grade level and concepts	1m. Applies mathematics skills (adding, subtracting, or multiplying) and strategies (using manipulatives, calculator, drawing, etc.) to solve a variety of problems 2m. Communicates mathematical ideas, relationships, and solutions using a variety of grade-appropriate mathematical representations 3m. Demonstrates use of mathematics reasoning through actions, words/explanation, making connections, extending ideas, <u>or stating generalizations</u> 4m. Uses mathematical language appropriate to grade level and concepts 5m. <u>Solutions are complete, meaning all of the needed work has been done</u>	1h. Applies mathematics skills (adding, subtracting, or multiplying) and strategies (using manipulatives, calculator, drawing, etc.) to solve a variety of problems 2h. Communicates mathematical ideas, relationships, and solutions using a variety of grade-appropriate mathematical representations 3h. Demonstrates use of mathematics reasoning through actions, words/explanation, making connections, extending ideas, <u>or stating generalizations</u> 4h. Uses mathematical language appropriate to grade level and concepts 5h. Solutions are complete <u>and clearly communicated</u>